

## Carnegie Institution of Washington Publications

### A New Molecular Recognition Instrument for Astrobiological Applications

- Fogel, M.L. & Scott, J.H. (2001). A new molecular recognition instrument for astrobiological applications [Abstract]. *General Meeting of the NASA Astrobiology Institute* (pp. 176-177), Carnegie Institution of Washington, Washington, DC.
- Fogel, M.L. & Scott, J.H. (2001). Rapid measurement of microbial proteomics by a new molecular recognition technology: The Linkage of the genome and geochemistry [Abstract]. *Eleventh Annual V.M. Goldschmidt Conference [Online]*. *LPI Contribution No. 1088*, Lunar and Planetary Institute, Houston, TX. Abstract #3378. Website: <http://www.lpi.usra.edu/meetings/gold2001/pdf/program.pdf>
- Neubauer, S.C., Megonigal, J.P., Emerson, D. & Weiss, J.V. (2001). Functional activity of iron-oxidizing bacteria: Implications for rhizosphere iron cycling [Abstract]. *Seventh International Symposium on the Biogeochemistry of Wetlands* (p. 126), Duke University, Durham, NC.
- Steele, A., McKay, D., Allen, C., Thomas-Keprrta, K., Warmflash, D., Pincus, S., Schweitzer, M., Priscu, J., Sears, J., Hedgecock, J., Avci, R. & Fogel, M. (2001). Mars immunoassay life detection instrument for astrobiology (MILD) [Abstract]. *32nd Lunar and Planetary Science Conference Abstracts [Online]*. Abstract #1684. Website: <http://www.lpi.usra.edu/publications/meetingpubs.html>

### Biological Studies of Hydrothermal Systems

- Baross, J.A. (2001). Microbial life in the subseafloor at mid-ocean ridges: A Key to understanding ancient ecosystems on Earth and elsewhere? [Abstract]. *NATO and NASA Advanced Studies Institute: Perspectives in Astrobiology*, Chania, Crete.
- Baross, J.A. & Lenovich, L.M. (In Press, 2001). Halophilic and osmophilic microorganisms. In: C. Vanderzant & D.F. Splitstoesser (Eds.). *Compendium of Methods for the Microbiological Examination of Foods, 4th edition*. Washington, DC: American Public Health Association.
- Bolton, S. & Baross, J.A. (2001). Phylogenetic diversity of microbial eukaryotes from diffuse fluids at Axial Volcano, Juan de Fuca Ridge [Abstract]. *Second International Symposium on Deep-Sea Hydrothermal Vent Biology*, Brest, France.
- Boyce, C.K., Hazen, R.M. & Knoll, A.H. (2001). Nondestructive, in situ, cellular-scale mapping of elemental abundances including organic carbon in permineralized fossils. *Proceedings of the National Academy of Sciences of the United States of America*, 98: 5970-5974.
- Butterfield, D.A., Roe, K.K., Baross, J., Huber, J., Feely, R., Gendron, J. & Lebon, G. (2000). Geochemical-microbial investigations in a submarine hydrothermal system [Abstract]. *RIDGE Theoretical Institute, The Subsurface Biosphere at Mid-Ocean Ridges*, Big Sky, MT.
- Crump, B.C. & Baross, J.A. (2000). Characterization of the bacterially active particle fraction in the Columbia River estuary. *Marine Ecology Progress Series*, 206: 13-22.
- Delaney, J.R., Kelley, D.S., Mathez, E., Yoerger, D., Baross, J., Schrenk, M. & Kaye, J. (2001). Edifice Rex sulfide recovery project: Interdisciplinary analysis of a sulfide microbial habitat from a submarine hydrothermal system. *Eos, Transactions of the American Geophysical Union*, 82: 67-71.
- Deming, J.W. & Baross, J.A. (In Press, 2001). Search and discovery of microbial enzymes from thermally extreme environments in the ocean. In: R.G. Burns & R.P. Dick (Eds.). *Enzymes in the Environments* (Chap. 14). New York: Marcel Dekker Publishing.
- Emerson, D. (2000). Bacterial iron oxidation at circumneutral pH [Abstract]. *Eos, Transactions of the American Geophysical Union*, 81(48), Fall Meeting Supplement [Online]. Abstract # B52E-01. Website: <http://www.agu.org/meetings/waisfm00.html>
- Emerson, D. & Bradburne, C. (2001). Morphological and metabolic aspects of neutrophilic, lithotrophic Fe-oxidizing from deep-ocean hydrothermal vents in the Pacific Ocean [Abstract]. *General Meeting of the NASA Astrobiology Institute* (p. 106), Carnegie Institution of Washington, Washington, DC.
- Hazen, R.M. (2001). Emergence and the origin of life [Abstract]. *General Meeting of the NASA Astrobiology Institute* (p. 29), Carnegie Institution of Washington, Washington, DC.
- Hazen, R.M. (2001). Life's rocky start. *Scientific American*, 284(4): 63-71.
- Hazen, R.M. (In Press, 2001). Emergence and the origin of life. In: G. Palyi (Ed.). *Proceedings of the Workshop on Life*, Modena, Italy, September, 2000.
- Hazen, R.M., Filley, T.R. & Goodfriend, G.A. (2001). Selective adsorption of L- and D-amino acids on calcite: Implications for the origin of biochemical homochirality [Abstract]. *General Meeting of the NASA Astrobiology Institute* (p. 12), Carnegie Institution of Washington, Washington, DC.

- Hazen, R.M., Filley, T.R. & Goodfriend, G.A. (2001). Selective adsorption of L- and D-amino acids on calcite: Implications for the origin of biochemical homochirality. *Proceedings of the National Academy of Sciences of the United States of America*, 98: 5487-5490.
- Hazen, R.M. & Roedder, E. (2001). How old are bacteria from the Permian age? *Nature*, 411: 155.
- Holden, J.F., Adams, M.W.W. & Baross, J.A. (2000). Heat-shock response in hyperthermophilic microorganisms. In: C.R. Bell, M. Brylinsky & P. Johnson-Green (Eds.). *Microbial Biosystems: New Frontiers* (pp. 663-670). *Proceedings of the 8th International Symposium on Microbial Ecology*, Halifax, Canada. Kentville, Nova Scotia: Atlantic Canada Society for Microbial Ecology.
- Holden, J.F., Takai, K., Summit, M., Bolton, S., Zyskowski, J. & Baross, J.A. (2001). Diversity among three novel groups of hyperthermophilic deep-sea Thermococcus species from three sites in the northeastern Pacific Ocean. *FEMS Microbiology Ecology*, 36: 51-60.
- Huber, J.A., Baross, J.A. & Butterfield, D.A. (2000). Exploring microbial diversity in a diffuse flow vent at Axial Seamount, Juan de Fuca Ridge over a two year period [Abstract]. *RIDGE Theoretical Institute, The Subsurface Biosphere at Mid-Ocean Ridges*, Big Sky, MT.
- Huber, J.A., Baross, J.A. & Butterfield, D.A. (2000). Microbial diversity in the subsurface biosphere at Axial Seamount, Juan de Fuca Ridge [Abstract]. *NSF Hyperthermophile Symposium*, University of North Carolina, Raleigh, NC.
- Huber, J., Butterfield, D. & Baross, J. (Submitted, 2001). Temporal changes in archaeal diversity and chemistry in a mid-ocean ridge subseafloor habitat. *Applied and Environmental Microbiology*.
- Kaye, J. & Baross, J.A. (2000). High incidence of halotolerant bacteria in Pacific hydrothermal-vent and pelagic environments. *FEMS Microbiology Ecology*, 32: 249-260.
- Kaye, J.Z. & Baross, J.A. (2000). Hyperthermohalophily? [Abstract]. *NSF Hyperthermophile Symposium*, University of North Carolina, Raleigh, NC.
- Kaye, J.Z. & Baross, J.A. (2000). Microbial adaptation to subseafloor brines in mid-ocean-ridge environments [Abstract]. *RIDGE Theoretical Institute, The Subsurface Biosphere at Mid-Ocean Ridges*, Big Sky, MT.
- Kaye, J.Z. & Baross, J.A. (2001). The combined effect of salt, pressure, and temperature on microbial processes and its application to extraterrestrial waters of unknown salinity [Abstract]. *NATO and NASA Advanced Studies Institute: Perspectives in Astrobiology*, Chania, Crete.
- Mehta, M. & Baross, J.A. (2000). Investigating the role of nitrogen fixation at hydrothermal vents [Abstract]. *NSF Hyperthermophile Symposium*, University of North Carolina, Raleigh, NC.
- Mehta, M. & Baross, J.A. (2001). Does biological nitrogen fixation occur in hydrothermal vents and the associated subseafloor biosphere? [Abstract]. *NATO and NASA Advanced Studies Institute: Perspectives in Astrobiology*, Chania, Crete.
- Mehta, M. & Baross, J.A. (2001). Evidence for potential nitrogen-fixing microbial communities at diffuse hydrothermal vents on the Juan de Fuca Ridge [Abstract]. *University of Washington Astrobiology Conference*, Crystal Mountain, WA.
- Mehta, M. & Baross, J.A. (2001). Investigating the role of nitrogen fixation at hydrothermal vents [Abstract]. *NATO and NASA Advanced Studies Institute: Perspectives in Astrobiology*, Chania, Crete.
- Mehta, M.P. & Baross, J.A. (2001). The role of biological nitrogen fixation in hydrothermal vent ecosystems [Abstract]. *Second International Symposium on Deep-Sea Hydrothermal Vent Biology*, Brest, France.
- Scott, J.H. & Fogel, M.L. (2001). Examination of carbon isotopic fractionation in amino acids to investigate microbial metabolism [Abstract]. *American Chemical Society, Abstracts of Papers*, 221st National Meeting: GEOC-59.
- Scott, J.H., Fogel, M.L. & Emerson, D. (2001). Use of the  $\delta^{13}\text{C}$  associated with amino acid biosynthesis as a proxy for examining the flow of carbon through biological systems [Abstract]. *General Meeting of the NASA Astrobiology Institute* (p. 132), Carnegie Institution of Washington, Washington, DC.
- Scott, J.H., Fogel, M.L. & Emerson, D. (2001). Utilization of the  $\delta^{13}\text{C}$  associated with amino acid biosynthesis as a proxy for examining the intermediary carbon metabolism of organisms [Abstract]. *Eleventh Annual V. M. Goldschmidt Conference* [Online]. *LPI Contribution No. 1088*, Lunar and Planetary Institute, Houston, TX. Abstract # 3870.
- Website: <http://www.lpi.usra.edu/meetings/gold2001/pdf/program.pdf>
- Scott, J.H. & Sharma, A. (2001). Experimental examination of the effects of hydrothermal conditions on microbial metabolism [Abstract]. *American Chemical Society, Abstracts of Papers*, 221st National Meeting: GEOC-177.
- Sharma, A. & Scott, J.H. (2001). Observations on microbial metabolism at extreme pressures [Abstract]. *General Meeting of the NASA Astrobiology Institute* (p. 134), Carnegie Institution of Washington, Washington, DC.
- Sharma, A., Scott, J.H., Cody, G.D., Fogel, M., Hazen, R.M., Hemley, R.J. & Huntress, Jr., W.T. (Submitted, 2001). Life at extreme pressures: Direct observations of microbial activity at 10,000 atmospheres. *Science*.
- Summit, M. & Baross, J.A. (2001). A novel microbial habitat in the mid-ocean ridge subseafloor. *Proceedings of the National Academy of Sciences of the United States of America*, 98: 2158-2163.

## Hydrothermal Organic Synthesis

- Brandes, J.A., Cody, G.D., Hazen, R.M. & Yoder, H.S. (2000). Stability and transformations of nitrogenous compounds under hydrothermal conditions [Abstract]. *Geological Society of America 2000 Annual Meeting*, Reno, NV, *Abstracts with Programs* [Online]. Abstract # 51514.
- Website: <http://www.geosociety.org/pubs/chooser.htm>

- Brandes, J.A., Cody, G.D., Hazen, R.M. & Yoder, Jr., H.S. (2001). Stability and transformations of nitrogenous compounds under hydrothermal conditions [Abstract]. *General Meeting of the NASA Astrobiology Institute* (p. 19), Carnegie Institution of Washington, Washington, DC.
- Brandes, J.A., Hazen, R.M., Yoder, Jr., H.S. & Cody, G.D. (2000). Early pre- and post-biotic synthesis of alanine: An alternative to the Strecker synthesis. In: G.A. Goodfriend, M.J. Collins, M.L. Fogel, S.A. Macko & J.F. Wehmiller (Eds.). *Perspectives in Amino Acid and Protein Geochemistry* (pp. 41-59). New York: Oxford University Press.
- Chou, I-M., Sharma, A., Burruss, R.C., Hemley, R.J., Goncharov, A., Stern, L.A. & Kirby, S.H. (2001). Diamond-anvil cell observations of a new methane hydrate phase in the 100-MPa pressure range. *Journal of Physical Chemistry A*, 105(19): 4664-4668.
- Chou, I-M., Sharma, A., Burruss, R.C., Shu, J., Mao, H-K., Hemley, R.J., Goncharov, A.F., Stern, L.A. & Kirby, S.H. (2000). Transformations in methane hydrates. *Proceedings of the National Academy of Sciences of the United States of America*, 97(25): 13,484-13,487.
- Cody, G.D., Boctor, N.Z., Filley, T.R., Hazen, R.M., Scott, J. H., Sharma, A. & Yoder, Jr., H.S. (2000). Primordial carbonylated iron-sulfur compounds and the synthesis of pyruvate. *Science*, 289: 1337-1340.
- Cody, G.D., Boctor, N.Z., Hazen, R.M., Scott, J., Sharma, A. & Yoder, Jr., H.S. (2001). Could biochemistry have hydrothermal origins? [Abstract]. *General Meeting of the NASA Astrobiology Institute* (p. 3), Carnegie Institution of Washington, Washington, DC.
- Cody, G.D., Boctor, N.Z., Hazen, R.M., Scott, J.H., Sharma, A. & Yoder, H.S. (2001). Hydrothermal origins of biochemical organosynthesis: A Red herring or the geochemical roots of life? [Abstract]. *Eleventh Annual V.M. Goldschmidt Conference* [Online]. *LPI Contribution No. 1088*, Lunar and Planetary Institute, Houston, TX. Abstract #3760.  
Website: <http://www.lpi.usra.edu/meetings/gold2001/pdf/program.pdf>
- Cody, G.D., Boctor, N.Z., Hazen, R.M. & Yoder, H. (2001). Experimental investigations into the potential hydrothermal origins of life [Abstract]. *Pacificchem 2000, Abstracts of Papers*, BIOS-620.
- Cody, G.D., Brandes, J., Hazen, R.M., Morowitz, H., Sharma, A. & Yoder, H. (2001). An experimental investigation into non-biological carbon fixation reactions under high temperature-high pressure conditions [Abstract]. *American Chemical Society, Abstracts of Papers*, 221st National Meeting: GEOC-154.
- Cody, G.D., Hazen, R.M., Brandes, J.A., Morowitz, H.A. & Yoder, Jr., H.S. (In Press, 2001). Geochemical roots of autotrophic carbon fixation: Hydrothermal experiments in the system citric acid-H<sub>2</sub>O-(+/-FeS)-(+/-NiS). *Geochimica et Cosmochimica Acta*.
- Hazen, R.M., Cody, G.D., Yoder, Jr., H.S. & Deamer, D.W. (2001). Hydrothermal production of amphiphilic molecules from pyruvate [Abstract]. *American Chemical Society, Abstracts of Papers*, 221st National Meeting: GEOC-158.
- Hazen, R.M., Cody, G.D., Yoder, Jr., H.S. & Deamer, D.W. (2001). Hydrothermal reactions of pyruvate: Production of amphiphilic molecules and vesicle formation [Abstract]. *General Meeting of the NASA Astrobiology Institute* (p. 31), Carnegie Institution of Washington, Washington, DC.
- Lemke, K.H., Ross, D.S., Bischoff, J.L. & Bird, D.K. (2001). Synthesis of alpha-amino acids in hydrothermal media from selected primitive starting compounds [Abstract]. *General Meeting of the NASA Astrobiology Institute* (p. 34), Carnegie Institution of Washington, Washington, DC.
- Ross, D.S., Lemke, K. & Matsuno, K. (2001). Peptide formation in hydrothermal environments [Abstract]. *General Meeting of the NASA Astrobiology Institute* (p. 57), Carnegie Institution of Washington, Washington, DC.
- Sharma, A., Cody, G.D., Hazen, R.M. & Hemley, R.J. (2001). In-situ monitoring of organic reactions under hydrothermal conditions [Abstract]. *American Chemical Society, Abstracts of Papers*, 221st National Meeting: GEOC-155.
- Sharma, A., McAdam, A., Cody, G.D., Hazen, R.M. & Hemley, R.J. (2001). Direct observations on the phase behavior of CO<sub>2</sub> in hydrothermal systems [Abstract]. *American Chemical Society, Abstracts of Papers*, 221st National Meeting: GEOC-127.
- Sharma, A., McAdam, A., Cody, G.D., Hemley, R.J., Hazen, R.M. & Chou, I-M. (2001). Experimental determination of phase equilibria in the system H<sub>2</sub>O-CO<sub>2</sub> at high pressure and temperature with implications on the presence of organic phases [Abstract]. *Eleventh Annual V.M. Goldschmidt Conference* [Online]. *LPI Contribution No. 1088*, Lunar and Planetary Institute, Houston, TX. Abstract #3841.  
Website: <http://www.lpi.usra.edu/meetings/gold2001/pdf/program.pdf>

## Studies in Planetary Formation and Evolution

- Bedding, T.R., Butler, R.P., Kjeldsen, H., Baldry, I.K., O'Toole, S.J., Tinney, C.G., Marcy, G.W., Kienzle, F. & Carrier, F. (2001). Evidence for solar-like oscillations in Beta Hydri. *Astrophysical Journal Letters*, 549: L105-L108.
- Boss, A.P. (2000). Gas giant planet formation and the implications for habitable planets [Abstract]. *Astrobiology: Life in the Universe Symposium*, Department of Molecular, Cellular, and Developmental Biology, University of Colorado, Boulder, CO.
- Boss, A.P. (2000). Massive planet formation through disk instability [Abstract]. In: O. Kessel-Deynet & A. Burkert (Eds.). *Ringberg Meeting: Star Formation 2000* (pp. 71-72). Max-Planck-Institut fur Astronomie, Heidelberg, Germany.

- Boss, A.P. (2000). Possible rapid gas giant planet formation in the solar nebula and other protoplanetary disks. *Astrophysical Journal Letters*, 536: L101-L104.
- Boss, A.P. (2000). Rapid formation of gas giant protoplanets by disk instability [Abstract]. American Astronomical Society, Division for Planetary Sciences, 32nd Meeting Program, Pasadena, CA. *Bulletin of the American Astronomical Society* [Online], 32(3): 52.09. Website: <http://www.aas.org/publications/baas/baasindex.html>
- Boss, A.P. (2000). Rapid gas giant planet formation. In: G.A. Lemarchand & K.J. Meech (Eds.). *Bioastronomy '99: A New Era in Bioastronomy. ASP Conference Series. Vol. 213*, (pp. 66-72). San Francisco, CA: Astronomical Society of the Pacific.
- Boss, A.P. (2001). Extrasolar planets: Giant giants or dwarf dwarfs? *Nature*, 409: 462-463.
- Boss, A.P. (2001). Formation of planetary-mass objects by protostellar collapse and fragmentation. *Astrophysical Journal Letters*, 551: L167-L170.
- Boss, A.P. (2001). Gas giant protoplanet formation: Disk instability models with detailed thermodynamics and radiative transfer [Abstract]. *32nd Lunar and Planetary Science Conference Abstracts* [Online]. Abstract #1193. Website: <http://www.lpi.usra.edu/publications/meetingpubs.html>
- Boss, A.P. (2001). Giant gas protoplanet formation: Rapid or slow? [Abstract]. *General Meeting of the NASA Astrobiology Institute* (p. 327), Carnegie Institution of Washington, Washington, DC.
- Boss, A.P. (2001). Injection of newly-synthesized elements into protosolar material [Abstract]. *Royal Society Discussion Meeting on the Origin and Early Evolution of Solid Matter in the Solar System*, London, England.
- Boss, A.P. (In Press, 2001). From disks to planets: An overview. In: F. Garzon, C. Eiroa, D. de Witner & T.J. Mahoney (Eds.). *Euroconference on Disks, Planetesimals, and Planets*. San Francisco, CA: Astronomical Society of the Pacific.
- Boss, A.P. (In Press, 2001). Gas giant protoplanet formation: Disk instability models with thermodynamics and radiative transfer. *Astrophysical Journal Letters*.
- Boss, A.P. (In Press, 2001). Modes of gaseous planet formation. In: A. Penny, P. Artymowicz, A.M. Lagrange & S. Russell (Eds.). *IAU Symposium 202: Planetary Systems in the Universe - Observation, Formation, and Evolution*, IAU Symposium, Manchester, UK. San Francisco, CA: Astronomical Society of the Pacific.
- Boss, A.P. (In Press, 2001). The formation of planets. In: A. Wootten (Ed.). *Science with the Atacama Large Millimeter Array*. San Francisco, CA: Astronomical Society of the Pacific.
- Boss, A.P. & Vanhala, H.A.T. (In Press, 2001). Injection of newly-synthesized elements into the protosolar cloud. *Philosophical Transactions of the Royal Society of London: Mathematical, Physical and Engineering Sciences*.
- Boss, A.P. & Wetherill, G.W. (In Press, 2001). Rapid formation of ice giant planets. *Nature*.
- Butler, R.P. & Marcy, G.W. (2001). Extrasolar planets [Abstract]. *General Meeting of the NASA Astrobiology Institute* (p. 319), Carnegie Institution of Washington, Washington, DC.
- Butler, R.P., Marcy, G.W., Fischer, D.A., Vogt, S.S., Tinney, C.G., Jones, H.R.A., Penny, A.J. & Apps, K. (In Press, 2001). Statistical properties of extrasolar planets. In: A. Penny, P. Artymowicz, A.M. Lagrange & S. Russell (Eds.). *IAU Symposium 202: Planetary Systems in the Universe - Observation, Formation and Evolution*, IAU Symposium, Manchester, UK. San Francisco, CA: Astronomical Society of the Pacific.
- Butler, R.P., Tinney, C.G., Marcy, G.W., Jones, H.R.A., Penny, A.J. & Apps, K. (In Press, 2001). Two new planets from the Anglo-Australian planet search. *Astrophysical Journal*.
- Butler, R.P., Vogt, S.S., Marcy, G.W., Fischer, D.A., Henry, G.W. & Apps, K. (2000). Planetary companions to the metal-rich stars BD -10° 3166 and HD 52265. *Astrophysical Journal*, 545(1, pt.1): 504-511.
- Chambers, J.E. & Wetherill, G.W. (2001). Planets in the asteroid belt. *Meteoritics & Planetary Science*, 36: 381-399.
- Desch, S.J. (Submitted, 2001). Enhanced magnetorotational instability due to resistivity anisotropies. *Astrophysical Journal Letters*.
- Desch, S., Kress, M., Dateo, C. & Huo, W. (2000). Signatures of disequilibrium chemistry in the solar nebula [Abstract]. *American Chemical Society, Abstracts of Papers*, 221st National Meeting: GEOC-8.
- Desch, S.J. & Mouschovias, T.C. (2001). The magnetic decoupling stage of star formation. *Astrophysical Journal*, 550: 314-333.
- Dombard, A.J. (2001). Topographic relaxation on the large icy satellites of Jupiter [Abstract]. *Jupiter: Planet, Satellites & Magnetosphere, Conference*, Boulder, CO.
- Fischer, D.A., Marcy, G.W., Butler, R.P., Vogt, S.S., Frink, S. & Apps, K. (2001). Planetary companions to HD 12661, HD 92788, and HD 38529 and variations in Keplerian residuals of extrasolar planets. *Astrophysical Journal*, 551: 1107-1118.
- Golimowski, D.A., Henry, T.J., Krist, J.E., Schroeder, D.J., Marcy, G.W., Fischer, D.A. & Butler, R.P. (2000). The very low mass component of the Gliese 105 system. *Astronomical Journal*, 120: 2082-2088.
- Hatzes, A.P., Cochran, W.D., McArthur, B., Baliunas, S.L., Walker, G.A.H., Campbell, B., Irwin, A.W., Yang, S., Kurster, M., Endl, M., Els, S., Butler, R.P. & Marcy, G.W. (2000). Evidence for a long-period planet orbiting Epsilon Eridani. *Astrophysical Journal Letters*, 544: L145-L148.
- Inaba, S., Tanaka, H., Nakazawa, K., Wetherill, G.W. & Kokubo, E. (2001). High-accuracy statistical simulation of planetary accretion: II. Comparison with N-body simulation. *Icarus*, 149: 235-250.

- Inaba, S. & Wetherill, G.W. (2001). Formation of Jupiter: Core accretion model with fragmentation [Abstract]. *32nd Lunar and Planetary Science Conference* [Online]. Abstract #1384. Website: <http://www.lpi.usra.edu/publications/meetingpubs.html>
- Kortenkamp, S.J. (2001). Asteroid formation with a pre-existing Jupiter [Abstract]. *32nd Lunar and Planetary Science Conference Abstracts* [Online]. Abstract #1796. Website: <http://www.lpi.usra.edu/publications/meetingpubs.html>
- Kortenkamp, S.J., Dermott, S.F., Fogle, D. & Grogan, K. (In Press, 2001). Sources and orbital evolution of interplanetary dust accreted by Earth. In: B. Peucker-Ehrenbrink & B. Schmitz (Eds.). *Accretion of Extraterrestrial Matter Throughout Earth's History*. Dordrecht: Kluwer Academic Publishers.
- Kortenkamp, S.J., Kokubo, E. & Weidenschilling, S.J. (2000). Formation of planetary embryos. In: R.M. Canup & K. Righter (Eds.). *Origin of the Earth and Moon*, (pp. 85-100). Tucson, AZ: University of Arizona Press.
- Kress, M.E., Desch, S.J., Dateo, C.E. & Benedix, G. (In Press, 2001). Shock processing of interstellar nitrogen compounds in the solar nebula. *Advances in Space Research*.
- Marcy, G.W., Butler, R.P., Fischer, D.A., Vogt, S.S., Lissauer, J.J. & Rivera, E.J. (In Press, 2001). A pair of resonant planets orbiting GJ 876. *Astrophysical Journal*.
- Marcy, G.W., Butler, R.P., Vogt, S.S., Liu, M.C., Laughlin, G., Apps, K., Graham, J.R., Lloyd, J., Luhman, K.L. & Jayawardhana, R. (In Press, 2001). Two substellar companions orbiting HD 168443. *Astrophysical Journal*.
- Marcy, G.W., Fischer, D.A., Butler, R.P. & Vogt, S.S. (In Press, 2001). Planetary messages in the doppler residuals. In: A. Penny, P. Artymowicz, A.M. Lagrange & S. Russell (Eds.). *IAU Symposium 202: Planetary Systems in the Universe - Observation, Formation and Evolution*, IAU Symposium, Manchester, UK. San Francisco, CA: Astronomical Society of the Pacific.
- McCarthy, C., Zuckerman, B. & Becklin, E.E. (2001). Searches for planets and brown dwarfs. [Abstract]. *General Meeting of the NASA Astrobiology Institute* (p. 335), Carnegie Institution of Washington, Washington, DC.
- McGovern, P.J., Solomon, S.C., Head, J.W., Smith, D.E. & Zuber, M.T. (In Press, 2001). Extension and uplift at Alba Patera, Mars: Insights from MOLA observations and loading models. *Journal of Geophysical Research*.
- McGovern, P.J., Solomon, S.C., Smith, D.E., Zuber, M.T., Neuman, G.A., Head, J.W., Phillips, R.J. & Simons, M. (2001). Gravity / topography admittances and lithospheric evolution on Mars: The importance of finite-amplitude topography [Abstract]. *32nd Lunar and Planetary Science Conference Abstracts* [Online]. Abstract #1804. Website: <http://www.lpi.usra.edu/publications/meetingpubs.html>
- Meibom, A., Desch, S.J., Petaev, M.I., Krot, A.N., Cuzzi, J.N., Wood, J.A. & Keil, K. (2001). An astrophysical model for the formation of zoned iron-nickel metal grains in the Bencubbin / CH-like chondrites, Queen Alexandra Range 94411 and Hammadah Al Hamra 237 [Abstract]. *Meteoritics & Planetary Science*, 35: A107.
- Phillips, R.J., Zuber, M.T., Solomon, S.C., Golombek, M.P., Jakosky, B.M., Banerdt, W.B., Smith, D.E., Williams, R.M.E., Hynek, B.M., Aharonson, O. & Hauck II, S.A. (2001). Ancient geodynamics and global-scale hydrology on Mars. *Science*, 291: 2587-2591.
- Solomon, S.C. & Head, J.W. (2000). The nature and evolution of Tharsis: Global context and new insights from MGS observations [Abstract]. *Abstracts, Tharsis Workshop*, Keystone, CO.
- Solomon, S.C., Johnson, C.L., Head, J.W., Zuber, M.T., Neumann, G.A., Aharonson, O., Phillips, R.J., Smith, D.E., Frey, H.V., Golombek, M.P., Banerdt, W.B., Carr, M.H. & Jakosky, B.M. (2001). What happened when on Mars?: Some insights into the timing of major events from Mars Global Surveyor data [Abstract]. *Eos, Transactions of the American Geophysical Union, 2001 Spring Meeting Abstracts* [Online]. Abstract # P31A-06. Website: <http://www.agu.org/meetings/waissm01.html>
- Tinney, C.G., Butler, R.P., Marcy, G.W., Jones, H.R.A., Penny, A.J., Vogt, S.S., Apps, K. & Henry, G.W. (2001). First results from the Anglo-Australian planet search: A brown dwarf candidate and a 51 Peg-like planet. *Astrophysical Journal*, 551: 507-511.
- Vanhala, H.A.T. & Boss, A.P. (2000). Injection of radioactivities into the presolar cloud: Convergence testing. *Astrophysical Journal*, 538: 911-921.
- Wetherill, G.W. & Inaba, S. (2000). Planetary accumulation with a continuous supply of planetesimals. *Space Science Reviews*, 92: 311-320.
- Wetherill, G., Kortenkamp, S. & Inaba, S. (2001). A new approach to planet and asteroid formation [Abstract]. *General Meeting of the NASA Astrobiology Institute* (p. 341), Carnegie Institution of Washington, Washington, DC.

## Studies of Organic Matter and Water in Meteorites

- Alexander, C.M.O'D., Boss, A.P. & Carlson, R.W. (In Press, 2001). The early evolution of the inner Solar System: A meteoritic perspective. *Science*.
- Boctor, N.Z., Alexander, C.M.O'D., Wang, J. & Hauri, E. (2000). Hydrogen-isotopic investigations of minerals and glasses in the martian meteorite Chassigny [Abstract]. *Meteoritics & Planetary Science*, 35 (Supplement): A29.
- Boctor, N.Z., Alexander, C.M.O'D., Wang, J. & Hauri, E. (2001). Hydrogen isotope studies of water-bearing post-stishovite silca phase and feldspathic glass in the martian meteorites Shergotty and Zagami [Abstract]. *32nd Lunar and Planetary Science Conference Abstracts* [Online]. Abstract #1309. Website: <http://www.lpi.usra.edu/publications/meetingpubs.html>

- Boctor, N.Z., Alexander, C.M.O'D., Wang, J. & Hauri, E. (2001). The source of extraterrestrial water in martian meteorites: Clues from hydrogen isotope composition of impact-melted glasses and magmatic melt-inclusion glasses [Abstract]. *Eleventh Annual V.M. Goldschmidt Conference* [Online]. LPI Contribution No. 1088, Lunar and Planetary Institute, Houston, TX. Abstract #3343.  
 Website: <http://www.lpi.usra.edu/meetings/gold2001/pdf/program.pdf>
- Boctor, N.Z., Alexander, C.M.O'D., Wang, J. & Hauri, E. (2001). The source of extraterrestrial water in martian meteorites [Abstract]. *General Meeting of the NASA Astrobiology Institute* (p. 157), Carnegie Institution of Washington, Washington, DC.
- Boctor, N.Z., Alexander, C.M.O'D., Wang, J. & Hauri, E. (In Press, 2001). Shock metamorphic effects and hydrogen isotope study of the martian meteorite Sayh Al Uhaymir 005 [Abstract]. *Meteoritical Society Meeting*, Rome, Italy. Abstract #5213.
- Cody, G.D., Alexander, C.M.O'D. & Tera, F. (2001). Solid state nuclear magnetic resonance studies of the Murchison organic macromolecule [Abstract]. *32nd Lunar and Planetary Science Conference Abstracts* [Online]. Abstract #2019.  
 Website: <http://www.lpi.usra.edu/publications/meetingpubs.html>
- Cody, G.D., Alexander, C.M.O'D. & Tera, F. (Submitted, 2001). Solid state (<sup>1</sup>H and <sup>13</sup>C) NMR spectroscopy of the insoluble organic residue in the Murchison meteorite: A Self-consistent quantitative analysis. *Geochimica et Cosmochimica Acta*.
- Cody, G.D., Boctor, N., Scott, J., Sharma, A., Hazen, R. & Yoder, H. (2000). Potential sources of organic matter in hydrothermal systems [Abstract]. *Geological Society of America 2000 Annual Meeting*, Reno, NV, *Abstracts with Programs* [Online], 32: A-3. Website: <http://www.geosociety.org/pubs/chooser.htm>
- Desch, S.J. & Connolly, Jr., H.C. (2001). Melting of chondrules and type B CAIs by nebular shocks [Abstract]. *32nd Lunar and Planetary Science Conference Abstracts* [Online]. Abstract #2163.  
 Website: <http://www.lpi.usra.edu/publications/meetingpubs.html>
- Desch, S.J. & Kress, M.E. (2001). Shock chemistry in the inner solar nebula [Abstract]. *General Meeting of the NASA Astrobiology Institute* (p. 331), Carnegie Institution of Washington, Washington, DC.
- Grossman, J.N., Alexander, C.M.O'D., Wang, J. & Brearley, A.J. (In Press, 2001). Zoned chondrules in Semarkona. *Meteoritics & Planetary Science*.
- Kehm, K., Alexander, C.M.O'D. & Hauri, E.H. (2001). High precision iron isotope measurements by multi-collector ICP-MS [Abstract]. *32nd Lunar and Planetary Science Conference Abstracts* [Online]. Abstract #1932.  
 Website: <http://www.lpi.usra.edu/publications/meetingpubs.html>
- Kehm, K., Alexander, C.M.O'D. & Hauri, E.H. (2001). Iron isotope measurements in meteorites and terrestrial rocks [Abstract]. *General Meeting of the NASA Astrobiology Institute* (p. 183), Carnegie Institution of Washington, Washington, DC.
- Kehm, K., Alexander, C.M.O'D., & Hauri, E.H. (2001). Precise iron isotope measurements using cold plasma ICP-MS [Abstract]. *Eleventh Annual V.M. Goldschmidt Conference* [Online]. LPI Contribution No. 1088, Lunar and Planetary Institute, Houston, TX. Abstract #3580.  
 Website: <http://www.lpi.usra.edu/meetings/gold2001/pdf/program.pdf>
- Kehm, K., Alexander, C.M.O'D., & Hauri, E.H. (In Press, 2001). Iron isotope measurements of terrestrial rocks and meteorites [Abstract]. *Meteoritical Society Meeting*, Rome, Italy [CD-ROM]. Abstract #5363.
- Kress, M.E. & Desch, S.J. (2001). Shock chemistry in the inner solar nebula: Implications for meteorites and protoplanetary disks [Abstract]. *32nd Lunar and Planetary Science Conference Abstracts* [Online]. Abstract #2096.  
 Website: <http://www.lpi.usra.edu/publications/meetingpubs.html>
- Minitti, M.E. & Mysen, B.O. (2001). Investigation of kaersutite crystallization in SNC magmas [Abstract]. *Eleventh Annual V.M. Goldschmidt Conference* [Online]. LPI Contribution No. 1088, Lunar and Planetary Institute, Houston, TX. Abstract #3419. Website: <http://www.lpi.usra.edu/meetings/gold2001/pdf/program.pdf>
- Minitti, M.E., Rutherford, M.J. & Weitz, C.M. (2001). Spectra of martian andesitic materials [Abstract]. *32nd Lunar and Planetary Science Conference Abstracts* [Online]. Abstract #1976.  
 Website: <http://www.lpi.usra.edu/publications/meetingpubs.html>
- Prewitt, C.T., Dera, P., Boctor, N.Z. & Hemley, R.J. (2001). High-pressure phase of silica from the martian meteorite Shergotty [Abstract]. *Eleventh Annual V.M. Goldschmidt Conference* [Online]. LPI Contribution No. 1088, Lunar and Planetary Institute, Houston, TX. Abstract #3077.  
 Website: <http://www.lpi.usra.edu/meetings/gold2001/pdf/program.pdf>

## Theoretical Studies of Hydrothermal Synthesis Reactions

- Amend, J.P. & Shock, E.L. (2000). Thermodynamics of amino acid synthesis in hydrothermal systems on early Earth. In: G.A. Goodfriend, M.J. Collins, M.L. Fogel, S.A. Macko & J.F. Wehmiller (Eds.). *Perspectives in Amino Acid and Protein Geochemistry* (pp. 23-40). New York: Oxford University Press.
- Amend, J.P. & Shock, E.L. (2001). Energetics of overall metabolic reactions of thermophilic and hyperthermophilic Archaea and Bacteria. *FEMS Microbiology Reviews*, 25: 175-243.

- McKinnon, W.B. & Shock, E.L. (2001). Ocean karma: What goes around comes around on Europa (or does it?) [Abstract]. *32nd Lunar and Planetary Science Conference Abstracts* [Online]. Abstract #2181. Website: <http://www.lpi.usra.edu/publications/meetingpubs.html>
- Meyer, D'A.R., Shock, E.L. & Amend, J.P. (2001). Hydrothermal habitats in astrobiology [Abstract]. *General Meeting of the NASA Astrobiology Institute* (p. 120), Carnegie Institution of Washington, Washington, DC.
- Morowitz, H.J., Kostelnik, J.D., Yang J. & Cody, G.D. (2000). The origin of intermediary metabolism. *Proceedings of the National Academy of Sciences of the United States of America*, 97(14): 7704-7708.
- Shock, E.L. (2000). Energy supply at the biotic fringe [Abstract]. *Eos, Transactions of the American Geophysical Union*, 81(48), Fall Meeting Supplement [Online]. Abstract # B72D-01. Website: <http://www.agu.org/meetings/waisfm00.html>
- Shock, E.L. (2000). Origin of life: Geological constraints. In: P.L. Hancock & B.J. Skinner (Eds.). *The Oxford Companion to the Earth* (pp. 763-766). New York: Oxford University Press.
- Shock, E.L. (2001). Aqueous abiotic organic synthesis as a common planetary process [Abstract]. *Eleventh Annual V.M. Goldschmidt Conference* [Online]. *LPI Contribution No. 1088*, Lunar and Planetary Institute, Houston, TX. Abstract #3815. Website: <http://www.lpi.usra.edu/meetings/gold2001/pdf/program.pdf>
- Shock, E.L., Amend, J.P. & Zolotov, M.Y. (2000). The early Earth vs. the origin of life. In: R.M. Canup & K. Righter (Eds.). *Origin of the Earth and Moon* (pp. 527-543). Tucson, AZ: University of Arizona Press.
- Zolotov, M.Y. & Shock, E.L. (2000). The oxidation state of Europa and other Galilean satellites [Abstract]. *Eos, Transactions of the American Geophysical Union*, 81(48), Fall Meeting Supplement [Online]. Abstract # P71A-06. Website: <http://www.agu.org/meetings/waisfm00.html>
- Zolotov, M.Y. & Shock, E.L. (2001). A hydrothermal origin for the sulfate-rich ocean of Europa [Abstract]. *32nd Lunar and Planetary Science Conference Abstracts* [Online]. Abstract #1990. Website: <http://www.lpi.usra.edu/publications/meetingpubs.html>
- Zolotov, M.Y. & Shock, E.L. (2001). Geochemical constraints on the oxidation states of the Europan ocean and mantle [Abstract]. *32nd Lunar and Planetary Science Conference Abstracts* [Online]. Abstract #2025. Website: <http://www.lpi.usra.edu/publications/meetingpubs.html>
- Zolotov, M.Y. & Shock, E. L. (2001). Stability of condensed hydrocarbons in the solar nebula. *Icarus*, 150: 323-337.
- Zolotov, M.Y. & Shock, E.L. (In Press, 2001). The composition and stability of salts on the surface of Europa and their oceanic origin. *Journal of Geophysical Research: Planets*.